R E M A R K S

Applicants' Claims

According to applicants' claims, a steel material is prepared in such a manner that 0.5 to 1.5 wt% carbon and a total amount of 0.2 to 2.0 wt% of one or more alloy elements selected from the group consisting of V, Ti, Zr, Nb, Ta and Hf are added in a casting stage so that 0.4 to 4.0 % by volume of special carbides of said alloy elements having an average particle diameter of 0.2 to 5 μm are dispersed therein.

A rolling element of the present claims is prepared and made of the steel material preliminarily treated in the above-described way in which fine cementites having an average particle diameter of 0.1 to 1.5 μm are further dispersed by spheroidizing, and a heat treatment is performed so that 2.5 to 10 wt% Cr is solid-dissolved (concentrated) in said cementites. A rolling contact surface of the rolling element is rapidly heated in a temperature region of 900°C or higher by induction hardening so that a part of the cementites is solid-dissolved in austenite, and quenching is performed thereafter. High-toughness martensite containing 0.3 to 0.8 wt% C therein is thus formed.

Regarding compositional characteristics, applicants' claims recite 0.4 to 4.0 % by volume of carbides having an average particle diameter of 0.2 to 5 μm and 2 to 15% by volume of cementite having an average particle diameter of 0.1 to 1.5 μm are dispersed in a parent phase of the high-toughness martensite containing 0.3 to 0.8 wt% C. Nitrides over 0.4 % by volume are not contained.

Obviousness Rejection

Claims 1 to 12, 20 to 23 and 25 to 27 were rejected under 35 USC 103 as being unpatentable over EP 950 723 for the reasons set forth in item nos. 3 to 12 on pages 2 to 4 of the June 19, 2007 Office Action.

It was admitted in the Office Action that a Cr concentration of 2.5 to 10 wt% in the cementite ($(FeCr)_3C$), as recited in claim 1, is not taught by the prior art.

It was also admitted in the Office Action that the prior art does not teach prior austenite grains having an ASTM grain size No. 10 as recited in applicants' claim 3.

It was further admitted in the Office Action that induction heating and heating at 150°C/sec or more, as recited in applicants' claims, is not taught by the prior art.

It was also admitted in the Office Action that the prior art does not teach a soluble carbon concentration of 0.3 to 8 wt% in the martensite of the quench hardened layer as recited in applicants' claims.

EP 950 723

A rolling element of EP 950 723 is obtained insuch a way that a fine carbide and/or carbonitride having an average grain size of 0.3 μm or less is dispered in the contact surface structure by carburizing and nitriding. After a cementite of 3 μm or less is dispersed in the surface structure while heating in a temperature region from the Al temperature to 900°C, a quenching treatment is performed on the rolling element.

Under the heat conditions for dispersing the cementite, since heating is performed in a carbon concentration range where austenite and cementite coexist, it is clear that the carbon concentration in a martensite after quenching does not exceed the

eutectoid carbon concentration of the alloy system (i.e., 0.8 wt% C).

Further, it is clear that because of the nitriding treatment, 0.4 to 2.5 wt% of nitrogen is diffused in the contract surface structure of the rolling element.

Withdrawal of the 35 USC 103 rejection is thus respectfully requested.

An INFORMATION DISCLOSURE STATEMENT is being filed concurrently herewith.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,

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Enclosures: (1) PETITION FOR EXTENSION OF TIME
(2) INFORMATION DISCLOSURE STATEMENT